

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>P06231PC00</b>	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. <b>PCT/SE 2003/001996</b>	International filing date (day/month/year) <b>18.12.2003</b>	Priority date (day/month/year) <b>18.12.2002</b>
International Patent Classification (IPC) or national classification and IPC <b>B01J 19/12</b>		
Applicant <b>PERSONAL CHEMISTRY I UPPSALA AB et al</b>		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
  - a. ☒ (sent to the applicant and to the International Bureau) a total of 3 sheets, as follows:
    - ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
    - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
  - b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) \_\_\_\_\_, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

- |                                     |              |   |
|-------------------------------------|--------------|---|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report   |
| <input type="checkbox"/>            | Box No. II   | Priority  |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability  |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention  |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/>            | Box No. VI   | Certain documents cited   |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application  |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application   |

Date of submission of the demand  <b>07.07.2004</b>	Date of completion of this report  <b>02.03.2005</b>
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88	Authorized officer  <b>Ingrid Grundfelt/ELY</b> Telephone No. +46 8 782 25 00

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE 2003/001996

## Box No. 1 Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language \_\_\_\_\_ which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))  
☐ publication of the international application (under Rule 12.4)  
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

☐ the international application as originally filed/furnished

☒ the description:

pages 1 - 7 as originally filed/furnished

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the claims:

pages \_\_\_\_\_ as originally filed/furnished

pages\* \_\_\_\_\_ as amended (together with any statement) under Article 19

pages\* 8 - 9 received by this Authority on 04.01.05

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☒ the drawings:

pages 1 - 2 as originally filed/furnished

pages\* 3 received by this Authority on 04.01.05

pages\* \_\_\_\_\_ received by this Authority on \_\_\_\_\_

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (specify): \_\_\_\_\_

☐ any table(s) related to the sequence listing (specify): \_\_\_\_\_

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages \_\_\_\_\_

☐ the claims, Nos. \_\_\_\_\_

☐ the drawings, sheets/figs \_\_\_\_\_

☐ the sequence listing (specify): \_\_\_\_\_

☐ any table(s) related to the sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE 2003/001996

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	<u>1-14</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-14</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-14</u>	YES
	Claims		NO

## 2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

- D1) WO-02/052279-A
- D2) DE-196 12 265-A
- D3) JP-61 033 657-A
- D4) DE-197 44 940-A
- D5) WO-02/089974-A
- D6) US-5 264 185-A

The present invention relates to a micro vial assembly for performing microwave-assisted chemical reactions on small volumes, especially organic synthesis reactions. It also relates to a system for performing microwave-assisted chemical reactions on small reaction-mixture volumes and the use of such a system.

The aim of the invention is to solve problems in connection with small reaction-mixture volumes. These problems are, for example, to design the geometry in the top portion of a reaction vessel, in order to facilitate reflux/reflow of liquid. The assembly should be adapted for co-operation with external equipment designed for micro-wave-assisted chemistry on a larger scale. The assembly should be designed to ensure comparative temperature and pressure detection results.

Amongst the documents cited in the search report, D1 comes closest to the invention according to the amended claims of January 4, 2005.

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## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: BOX V

D1 (abstract, p.1, p.3-4, p.6-p.7 and fig. 3-5) discloses a seal mechanism, an apparatus and a method for confining a chemical reaction in a reaction vessel (1) (vial tube). Microwaves can assist the reaction. The vessel has a cap (6) and a self-sealing diaphragm (5) at the top of the vessel.

The micro vial assembly in claim 1, the system for performing microwave-assisted chemical reactions in claim 11 and the use of such a system in claim 13 differ from what is disclosed in D1 in the subject matter stated on lines 6-11 in claim 1. Hence, the invention is novel.

The problems to be solved by the present invention (cf. the second paragraph on this form) are not revealed in D1. This document does not give any information that, would lead a person skilled in the art to the claimed method, system and use. Therefore, the claimed invention is not obvious to a person skilled in the art.

Consequently, the invention according to claims 1-14 is considered to involve an inventive step. It is further considered to be industrially applicable.

Concerning observations in the claims, see Box VIII.

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE 2003/001996

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The claims are not divided into a prior art part and a characterising part, cf. PCT, Rule 6.3 (b).

JC17 Rec'd PCT/PTO 15 JUN 2005

CLAIMS (2005-01-03)

1. A micro vial assembly for performing microwave-assisted chemical reactions on small volumes, the assembly comprising:
  - a micro-wave transparent reaction vessel (10) having an open upper end and a closed bottom end;
  - a cap (40) having a through hole, and a sealing diaphragm (30), wherein a sleeve (20) is formed with a through hole, the vessel extending axially through the sleeve and the cap securing the vessel to the sleeve while clamping the diaphragm for sealing the open upper end of the vessel, the open upper end of the vessel being formed with a widening portion (14,15,16), the widening portion being received in a corresponding recess formed in an end plane of the sleeve, the recess providing a seat (24) for the widening portion in the open upper end of the vessel.
2. The micro vial assembly of claim 1, wherein the upper end of the sleeve is formed circumferentially for engagement with the cap, the sleeve having a first diameter portion ( $D_1$ ) running from the upper end to meet a reduced diameter portion ( $D_2$ ) in the lower end of the sleeve.
3. The micro vial assembly of claim 2, wherein the portion of reduced diameter in the lower end of the sleeve is a truncated cone.
4. The micro vial assembly of claim 1, wherein the widening portion of the vessel (10) and the seat (24) in the end plane of the sleeve (20) are both conical in shape.
5. The micro vial assembly of any previous claim, wherein the open end of the vessel (10) is defined by a rim (16) protruding above the upper end of the sleeve (20) when the vessel is supported in the sleeve, the rim being dimensioned to be depressed in the lower side of the diaphragm (30).
6. The micro vial assembly of claim 5, wherein the rim (16) has an inner perimeter extending transversely to the diaphragm (30), sealing the open end of the vessel.
7. The micro vial assembly of claim 6, wherein the inner perimeter of the rim (16) defines a portion of the vessel cavity having a first radius  $r_1$ , said first radius

portion meeting a second portion of reducing radius  $r_2$ , the reducing radius portion smoothly transforming into a portion of continuous radius  $r_3$  defining a reaction chamber of the vessel cavity.

8. The micro vial assembly of any previous claim, wherein a bottom of the vessel (10) is formed through a radial compression (12) of the vessel, located above the terminal end (13) of the vessel.

9. The micro vial assembly of any previous claim, wherein the vessel (10) has an inner volume including a head-space volume which is less than 20 times that of the smallest reaction mixture volume contained in the vessel.

10. The micro vial assembly of any previous claim, wherein the vessel (10) is dimensioned for performing microwave-assisted chemical reactions on small volumes of 500  $\mu\text{l}$  or less.

11. A system for performing microwave-assisted chemical reactions on small reaction mixture volumes, comprising a micro vial assembly (10,20,30,40) according to any previous claim 1-10.

12. The system of claim 11, wherein the outer perimeter of the sleeve (20) is dimensioned for bridging the radial distance between a wall of the vessel (10) and an entrance diameter (D) of a microwave cavity (1) in the system.

13. The use of a micro vial assembly according to any of claims 1-10 for performing microwave-assisted chemical reactions, in particular microwave-assisted organic synthesis reactions.

14. The use of a system according to any of claims 11-12 for performing microwave-assisted chemical reactions, in particular microwave-assisted organic synthesis reactions.

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